

**Former Nebraska Ordnance Plant, Mead, NE**  
**FINAL - Site Management Plan**  
**Operable Unit 2 (Groundwater)**  
**MAY 2006**

OU2 Elements:

- 1.0 Groundwater Treatment System – Design, Construction, and Operations & Maintenance (O&M)
  - 1.1 Perform Main Treatment Plant O&M
  - 1.2 Complete Load Line 1 (LL1) Containment System (EW-12 & 13) Construction
  - 1.3 Perform LL1 O&M
  - 1.4 LL1 RA/OPS Report
  - 1.5 Complete EW-11 AOP Design
  - 1.6 Complete EW-11 AOP Construction
  - 1.7 Perform EW-11 AOP O&M
  - 1.8 EW-11 AOP RA/OPS Report
  - 1.9 Optimization Modeling
- 2.0 Plume Interior Investigation and Focused Extraction
  - 2.1 Complete GCW Technical Specifications
  - 2.2 NOP Sector 4 (Eastern side – LL4, Atlas Missile)
  - 2.3 NOP Sector 3 (Middle – LL3)
  - 2.4 NOP Sector 2 (Middle – LL2)
  - 2.5 NOP Sector 1 (Western side – LL1)
  - 2.6 GCW O&M
  - 2.7 Restoration Time Modeling
- 3.0 Annual Groundwater Monitoring Program (GMP)
  - 3.1 Perform Annual GMP Sampling
    - Sample impacted Residential Wells
    - O&M sampling of residential GAC units
    - Sample non-impacted Residential Wells in Buffer Zone
    - Sample surface water locations
    - Sample Downgradient Monitoring Wells for Containment Evaluation
    - Sample Eastern Plume Boundary Monitoring Wells
    - Sample interior Monitoring Wells to monitor plume behavior
- 4.0 Annual Remedy Performance Evaluation
  - 4.1 Complete Containment Evaluation Workplan
  - 4.2 Complete periodic computer groundwater model updates
  - 4.3 Complete installation of additional downgradient Monitoring Wells & Observation Wells
  - 4.4 Complete Annual Remedy Performance Reports
    - Annual Interpretation of GMP results - including new plume depictions
    - Annual Containment Evaluation of NOP Treatment System
    - Annual Evaluation of Impact from M.U.D. Operations
    - RA Report for new remedy components - after 12 months of operations

- 5.0 Eastern Plume Boundary Baseline & Monitoring
  - 5.1 Perform Eastern Perimeter Baseline Investigation to establish baseline
  - 5.2 Complete Eastern Plume Boundary Monitoring Network Design
  - 5.3 Complete Eastern Plume Boundary MW Installation
- 6.0 Additional Site Investigations to Evaluate Extent of Contamination
  - 6.1 Complete Phase 1 Investigation - MW-85 & Johnson Creek
  - 6.2 Perform investigation of contamination in bedrock
  - 6.3 Perform investigation of area south of EW-12 & 13
- 7.0 Community Relations
  - 7.1 Complete Updated Community Relations Plan
  - 7.2 Conduct RAB Meetings
  - 7.3 Maintain project Website
- 8.0 Exposure Pathway Assessment
  - 8.1 Exposure Pathway Assessment Screening Report
    - Review exposure scenarios previously evaluated (surface water exposures) - AND - other pathways not previously evaluated (vapor intrusion)
    - Determine Site-Specific risk based standards for surface water
- 9.0 Project Management
  - 9.1 Perform 5 Year Reviews for OU2
  - 9.2 Routine Project Management Activities

NOTES:

- 1. Remedial Action Completion Report (RACR)=Construction Completion Report (CCR)+Operating Properly and Successfully Report (OPS)
- 2. Schedule dates in this narrative are approximate. See attached GANTT schedule for exact dates.

REVISION HISTORY:

- 1. May 2006 = Original Publication Date of Final version

OU2 – Groundwater						
	Element Name	Scope	Primary Documents	Secondary or Other Documents	Approximate Schedule/Duration	Approximate Cost Estimate
1.0	Groundwater Treatment System – Design, Construction, and Operations & Maintenance (O&M)					
1.1	Perform Main Treatment Plant O&M	Conduct on-going operations of Main Treatment plant – including <ul style="list-style-type: none"> <li>Routine process monitoring</li> <li>NPDES discharge sampling &amp; Reporting</li> <li>Routine maintenance</li> </ul>		O&M Plan – updated as necessary	On-going operations every year until site closeout.	Approx. cost for treatment plant operations = \$1.4 to 2.5 Million per year \$1.4M already programmed in FUDS for 2 <sup>nd</sup> QTR FY06  FY06 = \$1.4M FY07 = \$1.9 M FY08 = \$2.5 M FY09 = \$2.6 M FY10 = \$2.7 M
1.2	Complete Load Line 1 (LL1) Containment System (EW-12 & 13) Construction	Complete construction of new LL1 treatment system	Construction Complete Report		Construction Schedule: Start - June 2005 Complete – May 2006	Approx. cost for construction = \$2.25M  Already on contract FY06 to FY10 = \$0
1.3	Perform LL1 O&M	Conduct on-going operations of LL1 system – including <ul style="list-style-type: none"> <li>Routine process monitoring</li> <li>Routine maintenance</li> </ul>		O&M Plan – updated to include LL1 system	On-going operations every year, until site closeout.	Future O&M costs related to LL1 system already accounted for in Item 1.1 above
1.4	LL1 RA/OPS Report	OPS portion of RA Report for LL1 treatment system	RA/OPS Report		Draft Report Submitted to EPA/DEQ = June 2007	Approx. cost for Report = \$50,000  Not yet on contract FY07 = \$50,000
1.5	Complete EW-11 AOP Design	Remedial Design for EW-11 Advanced Oxidation Process (AOP) treatment system	Remedial Design		Design Schedule: Start – July 2005 Complete – Sept 2006	Approx. cost for design = \$140,000  Already on contract FY06 to FY10 = \$0

OU2 – Groundwater						
	Element Name	Scope	Primary Documents	Secondary or Other Documents	Approximate Schedule/Duration	Approximate Cost Estimate
1.6	Complete EW-11 AOP Construction	Complete construction of new AOP treatment system at EW-11	RA Workplan  Construction Complete Report		Construction Schedule Start – Sept 2006 Complete – Nov 2007	Approx. cost for construction = \$1 Million  Not Yet on contract  \$1M already programmed in FUDS for 2 <sup>nd</sup> QTR FY06  FY06 = \$1M FY07 to FY10 = \$0
1.7	Perform EW-11 AOP O&M	Conduct on-going operations of EW-11 AOP system – including <ul style="list-style-type: none"> <li>Routine process monitoring</li> <li>Routine maintenance</li> </ul>		O&M Plan – updated to include EW-11 AOP system	On-going operations every year, until site closeout.	Future O&M costs related to EW-11 system already accounted for in Item 1.1 above
1.8	EW-11 AOP RA/OPS Report	OPS portion of RA Report for EW-11 AOP treatment system	RA/OPS Report		Draft Report Submitted to EPA/DEQ = Sept 2008	Approx. cost for Report = \$50,000  Not yet on contract FY09 = \$50,000
1.9	Optimization Modeling	Perform optimization modeling on extraction system to: <ul style="list-style-type: none"> <li>Evaluate alternate pumping scenarios that still result in adequate capture</li> </ul>		Optimization Model Report  Restoration Modeling Report	Optimization Modeling Schedule Start - Mar 2006 Complete – Jan 2007  Restoration Modeling Schedule Start – Aug 2006 Complete – Sept 2007	Approx. cost for optimization modeling = \$199,000  Already on contract  No additional funding needed in FY06 to FY10
2.0	Plume Interior Investigation & Focused Extraction					
2.1	Complete GCW Technical Specifications	Engineering design for GCW's  Exact number and location of GCW's = To Be determined based on investigation results	RD Document		Design Schedule Start – Jan 2007 Complete – Apr 2007	Approx. cost for design = \$100,000  Not currently on contract  No funding yet programmed in FUDS  FY06 = \$0 FY07 = \$100,000 FY08 to FY 10 = \$0

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	Element Name	Scope	Primary Documents	Secondary or Other Documents	Approximate Schedule/Duration	Approximate Cost Estimate
2.2	NOP Sector 4 (Eastern side - LL4)	Starting in 2006 and Each year after until 2010 Subdivide NOP site into 4 sections to undergo more detailed investigation each year	PDI Workplan  PDI Report		Investigation Schedule Start = Sept of each year Complete = Aug of each year	Approx. cost for PDI Investigation = \$300,000 each year
2.3	NOP Sector 3 (Middle – LL3)	Investigation to be followed each year by focused extraction – GCW's Pre-Design Investigation	Mini-FS (Technology Screening Report)		Installation Schedule Start = Aug of each year Complete = July of each year	Approx cost for GCW Installation = \$1.1M each year
2.4	NOP Sector 2 (Middle – LL2)	<ul style="list-style-type: none"> <li>sampling to better characterize plume interior</li> <li>identify areas of high concentration, for purpose of locating GCW wells</li> </ul>	Design Document			Not currently on contract
2.5	NOP Sector 1 (Western side – LL1)	<ul style="list-style-type: none"> <li>sampling to determine presence or non-presence of DNAPL in Sectors 4 and 1, where potential for DNAPL exists</li> </ul> GCW Installation <ul style="list-style-type: none"> <li>Exact number and location to be determined by investigation results</li> </ul> Technology Screening Report – Streamlined FS-like evaluation of RA costs associated with hot-spot treatments and possible impacts to restoration times. The scope of the TSR will include a comparison of alternative technologies other than those specified in the 1997 OU2 ROD.	RAWP  Construction Complete Report  OPS Report			No funding yet programmed in FUDS  FY06 = \$0 FY07 to FY10 = \$1.4M per year
2.6	GCW O&M	Conduct on-going operations of GCW's – including <ul style="list-style-type: none"> <li>Routine process monitoring</li> <li>Routine maintenance</li> </ul>		O&M Plan – updated to include GCW's	On-going operations every year, until site closeout.	Future O&M costs related to EW-11 system already accounted for in Item 1.1 above
2.7	Restoration Time Modeling	Model results will be used to support the “mini-FS-like” evaluations of each plume Sector, after investigations or each Sector are performed. Upfront effort is needed to incorporate modifications to the model that will facilitate predictive modeling for the purpose of trying to estimate any potential reductions of overall restoration time resulting from source zone or hot-spot treatments via focused extraction or other possible technologies.		Restoration Time Modeling Report	Restoration Time Modeling Start = Aug 2006 Complete = Sept 2007	Already accounted for in Item 1.9 above

OU2 – Groundwater						
	Element Name	Scope	Primary Documents	Secondary or Other Documents	Approximate Schedule/Duration	Approximate Cost Estimate
3.0	Annual Groundwater Monitoring Program (GMP)					
3.1	Perform Annual GMP Sampling & Reporting	<div>GMP Sampling includes:<ul style="list-style-type: none"><li>▪ Sample impacted Residential Wells</li><li>▪ O&amp;M sampling of residential GAC units</li><li>▪ Sample non-impacted Residential Wells in Buffer Zone</li><li>▪ Sample surface water locations</li><li>▪ Sample Downgradient Monitoring Wells for Containment Evaluation</li><li>▪ Sample Eastern Plume Boundary Monitoring Wells</li><li>▪ Sample interior Monitoring Wells to monitor plume behavior</li></ul></div> <div>Annual GMP Sampling Plan:<ul style="list-style-type: none"><li>• Presents list of wells (and surface water locations) to be sampled, including frequency and analytes</li><li>• Based on previous year’s GMP Annual Report, and current year data available to date</li><li>• Based on previous year’s Containment Evaluation Report</li><li>• GMP Sampling Plan does not call-out data gaps or additional investigation - Any additional investigation work that may be needed will be defined and documented in separate documents</li></ul></div> <div>Quarterly GMP Data Summary Reports:<ul style="list-style-type: none"><li>• Document all sampling results from GMP, including monitoring wells, residential wells, surface water, etc...</li></ul></div> <div>Annual Non-IAG Report of Findings for other non-DoD compounds detected<ul style="list-style-type: none"><li>• Simple data summary report of findings for other non-DoD compounds detected</li><li>• Not subject to EPA/DEQ review and/or revision</li><li>• For EPA/DEQ information only</li></ul></div>		<div>Annual GMP Sampling Plans</div> <div>Quarterly GMP Data Summary Reports</div> <div>Annual Non-IAG report of findings for other non-DOD compounds detected</div>	On-going monitoring every year, until site closeout.	<div>Approx. cost for GMP = \$0.6 - 0.9 Million per year</div> <div>\$0.6M already programmed in FUDS for FY06</div> <div>FY06 = \$0.6M FY07 = \$0.8 M FY08 to FY10 = \$0.9 M per year</div>

OU2 – Groundwater						
	Element Name	Scope	Primary Documents	Secondary or Other Documents	Approximate Schedule/Duration	Approximate Cost Estimate
4.0	Annual Performance Evaluation					
4.1	Complete Containment Evaluation Workplan	Containment Evaluation Workplan will serve 2 purposes- 1. Define need for additional monitoring wells needed to assess containment 2. Provide standard working definition of containment and parameters to measure necessary to assess containment	Containment Evaluation Workplan		Containment Evaluation Workplan Schedule Start - July 2005 Complete - May 2006	Approx. cost for evaluation = \$160,000  Eval WP Already on contract  No funding needed in FY06 to FY10
4.2	Complete periodic computer groundwater model updates	Periodic updates to existing groundwater computer model. Updates to be performed if/when significant new site information becomes available that would warrant changes to the model		2006 Groundwater Modeling Update Report	For planning purposes – Assume model will be updated every other year, starting in 2006	Approx. cost for modeling = \$52,000  2006 Model Update already on contract  FY06 = \$0 FY07 = \$0 FY08 = \$52,000 FY09 = \$0 FY10 = \$52,000
4.3	Complete installation of additional downgradient Monitoring Wells and Observation Wells	Install additional Monitoring Wells & Observation Wells - IAW Containment Evaluation Workplan - Assume monitoring well installation procedures will be same as what has always been used.	Monitoring Well Installation Workplan		Possible multiple periods of field work for well drilling during CY2006	Approx. cost for additional wells = \$549,565  Already on contract  No funding needed in FY06 to FY10
4.4	Complete Annual Remedy Performance Report (ARPR)	ARPR includes: ▪ Annual Interpretation of GMP results - including new plume depictions ▪ Annual Containment Evaluation ▪ Annual Evaluation of Impact from M.U.D. Operations ▪ RA Report for Existing remedy (Main Treatment Plant) to be included in 2006 ARPR	ARPR		Submittal JULY of each year	Approx. cost for evaluation = \$182,000  2006 Evaluation Report already on contract (scheduled for 2007)  FY06 = \$0 FY07 to FY10 = \$182,000 per year

OU2 – Groundwater						
	Element Name	Scope	Primary Documents	Secondary or Other Documents	Approximate Schedule/Duration	Approximate Cost Estimate
5.0	Eastern Plume Boundary Baseline & Monitoring					
5.1	Perform Eastern Perimeter Baseline Investigation to establish baseline	Perform field sampling effort to determine “Baseline” conditions of Mead plume – especially along eastern boundary	M.U.D. Baseline Investigation Workplan  M.U.D. Baseline Investigation Report		Investigation Field Work Start - Feb 2006 Complete - Sept 2006	Approx. cost for investigation = \$475,000  Already on contract  No additional funding needed in FY06 to FY10
5.2	Complete Eastern Plume Boundary Monitoring Network Design	Establish agreed upon network of monitoring wells for Eastern Plume Boundary Monitoring Network	Eastern Plume Boundary Monitoring Network Design		Monitoring Network Design Start - July 2006 Complete - Sept 2006	Not currently on contract  NWK In-House Work Product  In-House funds already programmed into FUDS FY06
5.3	Complete Eastern Plume Boundary Monitoring Network Installation	Install additional monitoring wells	MW Installation Workplan		MW Installation Schedule = Start - Aug 2006 Complete – Feb 2007	Approx. cost for installation = \$549,565  Already on contract  No additional funding needed in FY06 to FY10
6.0	Additional Site Investigations to Evaluate Extent of Contamination					
6.1	Complete Phase 1 Investigation - MW-85 & Johnson Creek	Conduct geoprobe sampling in vicinity of MW-85, Johnson Creek, and other select areas		MW-85/Johnson Creek Investigation Workplan  MW-85/Johnson Creek Investigation Report	Field work Schedule = Start - October 2005 Completed - November 2005  Report submitted Dec 2005	Approx. cost for investigation = \$514,000  Already on contract  No additional funding needed in FY06 to FY10

OU2 – Groundwater						
	Element Name	Scope	Primary Documents	Secondary or Other Documents	Approximate Schedule/Duration	Approximate Cost Estimate
6.2	Perform investigation of contamination in bedrock	Possible investigation effort to determine contamination in bedrock	Investigation workplan  Investigation Report		Schedule Start – January 2010 Complete – August 2010	Approx. cost for investigation = \$449,000  Not Yet on Contract  FY06 = \$0 FY07 = \$0 FY08 = \$0 FY09 = \$0 FY10 = \$449,000
6.3	Perform investigation of area south of EW-12 & 13	Conduct investigation in area south of EW-12 & 13 near Silver Creek.  Should be performed after approx 12 months of normal EW-12 & 13 operations	Investigation Workplan Addenda  Investigation Report		Schedule Start – Jan 2006 Complete – May 2006	Already on contract  No funding needed in FY06 to FY10
7.0	Community Relations					
7.1	Updated Community Relations Plan	Update of existing CRP	CR Plan		Schedule Start – June 2006 Complete – Oct 2006	Not currently on contract  NWK In-House Work Product  In-House funds already programmed for FY06
7.2	Perform quarterly RAB Meetings	Continue to conduct quarterly RAB Meetings			On-going public meetings every year, until site closeout.	Contractor costs included in overall project management  NWK In-House Work Product  In-House funds need to be programmed into FUDS FY06-FY10



OU2 – Groundwater						
	Element Name	Scope	Primary Documents	Secondary or Other Documents	Approximate Schedule/Duration	Approximate Cost Estimate
7.3	Maintain Project Website	Maintain existing project website - to include new information as it becomes available			On-going maintenance effort every year, until site closeout.	Not currently on contract  NWK In-House Work Product  In-House funds need to be programmed into FUDS FY07-FY10
8.0	Exposure Pathway Assessment					
8.1	Exposure Pathway Assessment Screening Report –to review exposure scenarios previously AND not previously evaluated (Vapor Intrusion)	<ul style="list-style-type: none"> <li>Review exposure scenarios previously evaluated (surface water exposures) - AND - other pathways not previously evaluated (vapor intrusion)</li> <li>Determine Site-Specific risk based standards for surface water</li> </ul>		Exposure Pathway Assessment Report	Exposure Pathway Assessment Schedule = Start – Aug 2006 Complete – Dec 2006	Approx. cost for assessment = \$100,000  Already on contract  No additional funding needed in FY06 to FY10
9.0	Project Management					
9.1	Perform 5 Year Reviews for OU2	Conduct 5 Year Reviews in accordance with prevailing guidance/regulations	5 Year Review Report		First 5 Year Review for OU2 due Feb 2007. Future 5 Year Review Reports due every 5 years in accordance with prevailing guidance/regulations.	Approx. cost for assessment = \$117,000  Already on contract  No additional funding needed in FY06 to FY10
9.2	Routine Project Management Activities	Overall level of effort for NWK to manage this project		Quarterly reports  Monthly PM Meetings, Minutes	On-going project management every year, until site closeout	Contractor costs: Approx annual cost for overall PM = \$350,000  Future years not yet on contract FY06 = \$0 FY07 to FY10 = \$350,000 per year  In-House funds need to be programmed into FUDS FY07-10